

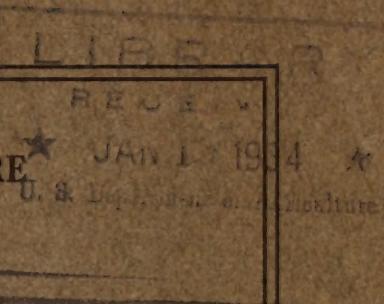
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UNITED STATES DEPARTMENT OF AGRICULTURE



FOREST SERVICE

# BRANCH OF RESEARCH

## MONTHLY REPORT

OF

FOREST EXPERIMENT STATIONS

FOREST ECONOMICS

FOREST PRODUCTS

RANGE RESEARCH

OCT 7 1933





BRANCH OF RESEARCH

October, 1933

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ANSWER TO QUEST

TABLE I (continued)

APPALACHIAN FOREST EXPERIMENT STATION

Management - Mountain Hardwood Forest

Buell, C. A. Abell and M. S. Abell made the first five-year remeasurement of five half-acre thinning plots in second growth yellow poplar at Cranberry, N. C. A selection thinning, crown thinning, thinning from below, and two controls make up this series. The plots are in a nearly pure even-aged stand about 46 years old, which came in following a clear cutting for charcoal wood by the Cranberry Coal and Iron Company. Sprouting of stumps of trees cut in 1929 was veryfeeble. The sprouts were of poor form and showed no promise of growing into trees.

On the same area a thinned and a control plot in yellow poplar were remeasured which had been established in 1920 by J. S. Holmes, State Forester of North Carolina.

Management - Coastal Plain

The Franklin, Va., selective-logging sample plots were visited and partially reexamined by MacKinney and Buell. There has been little mortality of the trees over 2.5 inches d.b.h. since the March 1933 accidental fire. On the reproduction quadrats most of the hardwoods, all of which were killed by the fire, have sprouted again. There have been few new accessions because most of last year's seed was consumed by the fire.

The quadrats on the Windsor, N. C., selective-logging permanent sample plots were also reexamined. These plots are now fairly well stocked with loblolly pine reproduction. However, over 50 percent of the reproduction is now overtapped by hardwoods which in many cases will cause the death of the pines.

Fire Damage - Mountains

A series of three plots are being installed at Bent Creek. One of the plots is to be a control, one is to be burned once, and the third is to be subjected to repeated burns as often as conditions warrant. These plots are to furnish information on the effect of single and repeated burns on the mortality and subsequent growth in the type represented. The stand consists mainly of white, black, scarlet and post oaks with a sprinkling of pine, both shortleaf and pitch, averaging a little better than a total for all species of 1,000 trees per acre. Each plot is about 2 1/2 acres and has been subdivided into tenth acre units to facilitate compilation and statistical analysis. It is planned to make the first burn on the area in the spring of 1934.

Fire-Weather

Pierce reports that from May 5 to November 1 no fire-weather forecasts were issued. During this period of inactivity, two changes in the line-up of reporting stations were made, for the purpose of improving the service. Due to the need for economy, no expansion of area for which the service is operated was undertaken.

(Over)

At the end of September, one year's record of humidity and temperature at the three weather stations, at different elevations on the same slope at Bent Creek, was completed. These records were taken by the Station and tabulation and summaries made by Pierce of the Weather Bureau. He has the bi-hourly temperatures and humidities now available for the year. This information is now being studied. It is being treated primarily from the meteorological standpoint, and in this form will be available for application to problems of forestry when required. The presence of a frost pocket in the valley has been clearly demonstrated.

### Forest Pathology

Field plots have now been established comparing the abundance of fruiting of the Nectria canker fungus on felled versus girdled cankered trees in southern West Virginia and on the Bent Creek Experimental Forest. The plots in West Virginia are in black walnut, and those at Bent Creek are in yellow poplar. The object of this work is to determine whether felling or girdling is the best measure to adopt in eliminating Nectria canker, where utilization or burning the cankered trees is not feasible. This work is being conducted by F. G. Liming.

Cross-inoculations with the Nectria canker fungus are now well under way. Nectrias from a number of species of trees are being inoculated into a number of different species of hardwoods in order to determine whether or not it is possible for the Nectria from one species to produce cankers on another species. The results of this work will have direct application in control work because it will tell us whether or not it is necessary to remove cankered trees of one species, e.g. birch, to protect another species, e.g. yellow poplar. This work is being done at Bent Creek and near Dillingham, N. C., by F. G. Liming, under the direction of Dr. G. H. Hepting.

Laboratory studies on the new pine canker, at present referred to as Atropellis pinicola, are being conducted by M. L. Lohman. Comparison of the eastern form with the western, and in comparisons of the eastern form with various related pine fungi are being made.

Diller is continuing his plantation clean-up work of the pine canker on slash pine in Georgia.

Hepting has completed a survey of disease conditions on stand improvement areas in the vicinity of all C.C.C. camps on the Pisgah and Nantahala National Forests, and part of the camps on the George Washington, Monongahela, and Unaka National Forests. Recommendations have been made to the supervisory staffs on the control of the more important diseases found.

## CALIFORNIA FOREST EXPERIMENT STATION

### General

During most of the month Director Kotck has been in Washington. This Station has lost for the duration of the NRA program W. C. Lowdermilk, who has been loaned by the Department to become Associate Director of the National Erosion Control organization.

### Forest Management - Pine Region

#### Experimental Forests - At Black's Mountain on the Lassen.

Drew's ECW crew of these parties continued with the inventory and mapping of the experimental forest. If good weather continues possibly nine of the fifteen sections will be covered this fall. About 18,000 feet of main truck road has been located most of which will be graded before the ECW camp is moved.

On the Feather River forest the main arterial truck road has been completed by the ECW Camp. An additional two miles of spur roads will probably be finished this fall. Fencing the Station's withdrawal and the Butterfly reserve should be soon completed. A new well has been dug, and a large warehouse-garage and new Superintendent's house are being built. Plans for the Regional training school buildings have been made.

### Stand Improvement.

In connection with the large Nira program of stand improvement work planned by the Region Dunning has visited several forests with Woodbury. Three crews of twelve men each are working on the Lassen, Plumas and Stanislaus on an experimental basis to iron out the kinks before the major work begins. The work is confined to release of valuable species and thinning dense stands of pine advance growth on sale and exchange areas. Some experimental work was done earlier at Stanislaus Branch under E.C.F. designed to rescue sugar pine advance growth from competition with less valuable species. Results of this work may reveal troublesome complications. Slender weak sugar pine seedlings with tops and roots balanced for a shaded existence may not survive sudden exposure with increased transpiration. Some of the older needles are turning yellow since the earliest work of August. It is hoped that only temporary reduction of foliage will result and that by next spring expansion of the root system will enable the trees to survive.

### Range Research

#### Damage to pine reproduction

The survey of the extent, seriousness, and character of the damage to ponderosa and jeffrey pine reproduction by both sheep and cattle has been practically completed on the Blacks Mountain Experimental range. Over 1,000 temporary mil-acre plots have been examined in this survey.

## Management of Foothill ranges

The final sifting of all information pertaining to the selection of the work center for this project has been completed. The actual site desired has been selected.

### Fire Research

The test-fire program was completed with the running of the final 30 fires, bringing the total number for the season to 201. Following the completion of the field program, the force returned to Berkeley after a six-months period spent practically continuously at Mt. Shasta.

The main lines of office work on the test-fire program are planimetering the fire charts (Dennison) and rating visibility conditions in the direction of the test smokes from the summer's records (Buck). The planimetering of the fire charts involves an average of ten planimeterings for each of the 200 charts, as the fires were plotted at two-minute intervals. In addition the perimeter of the fires at two-minute intervals is determined by a map measuror. Fortunately, a good deal of this tedious work was completed during the summer. Decision has been reached to express visibility as a per cent of maximum visibility in the direction of the fire at the given hour as determined by visibility meter readings on natural targets.

Brown's work in detection planning has been brought one step nearer completion by the final consideration of the Eldorado and Stanislaus forests at conferences in Berkeley during October. These were the last of the northern California forests and leave only the four southern California forests to be considered along with Los Angeles County and the State detection system.

### Forestation

With the aid of C.C.C. crews major improvements have been made at both our nurseries. At Feather River soil improvement by the introduction of black forest soil, and at Devil Canyon the terracing and screening of soil for additional seedbeds and transplant space constituted the direct nursery improvements.

### Seed Collection

Seed collection of the principal conifer species in the region has been done by the C.C.C. under supervision of the Regional Office. The Experiment Station has undertaken the collection of a large supply of broadleaf tree, shrub and herb species for use in erosion control ranger station planting and exchange. The seed collecting crew for this work consists of a professional botanist thoroughly trained in California flora, and a forester, graduate of Heidelberg University in Germany, both under ECW appointments. This large supply of seeds is being placed in cold storage at 370° F. in friction-top tins, to supply our needs for several

years. Experiments conducted during the past year indicate that a period of cold storage stimulates germinability both as to time and numbers.

Many of our native shrub seeds are extremely refractory in germination. A program of investigation has been started to discover a treatment for overcoming this difficulty so that direct sowing can be practiced in erosion control work. Direct seeding is necessary especially to speed up revegetation of new road slopes and gullies of mountain meadows. The use of nursery grown bare-root or potted plants for these purposes is almost prohibitive because of the vast numbers required for effective control.

### Ecology

A major job of mapping riparian vegetation in 3500 feet of "Y"-Canyon water use study was accomplished. This study presents the interesting problem of setting up a satisfactory unit of vegetation with which to interpret the water losses from the stream. While the method has not yet been fully determined, it appears that basal area of the various species will provide one useful index. Efforts at photographing crown density have been somewhat disappointing. In the complete map only trees above two inches in diameter were shown and smaller trees and all other ground cover vegetation being recorded by means of twenty transects across the canyon. Profiles of the transects, telescoped laterally have been drawn as an aid in showing the distribution and stature of the vegetation.

### Erosion Streamflow Project

#### San Dimas Experimental Forest

The three concrete flumes and dams for the Bell Canyon triplicate watersheds are practically completed. Rain gauges are being installed on the watersheds, on a system of contour trails that were completed during the past summer by C.C.C.

The flumes and dams for the Fern Canyon triplicate watershed area are from 80 to 95 per cent completed. Rain gauges are being installed on a system of contour trails similar to that at Bell Canyon.

#### "Y"-Canyon Study at Devil Canyon Branch

The suspected leak along a limestone dyke between "Y"-Canyon and the adjacent east fork of Devil Canyon was verified and a preliminary measurement of the flow was made by the water department of the City of San Bernardino. This development is of extreme importance to our study since an effort must now be made to evaluate the loss before a valid interpretation of our two years of flow records for the canyon is possible.

### Erosion Control

#### Range Erosion Control

Deep gullying of mountain meadows during the past fifteen years has been an important cause of range deterioration in the California

region. The consequent lowering of the water table in wet meadows has resulted in gradual deterioration of the valuable forage cover and a serious invasion of sagebrush and other unpalatable species. Gully control work was provided for in the ECW programs of all grazing forests in the Region. The Experiment Station, in cooperation with the Regional Office, employed civil engineer A. F. Pillsbury to head up this work in a technical capacity. After a field trip, with Nelson of the R.O. and Kraebel, during which a study was made of control work done on some old control projects on both private and Forest land, the program was outlined which has been executed during the past summer. Pillsbury went from forest to forest, instructing the foremen, getting the work started in each project, and later checking up on each project. The work consisted primarily of constructing check dams and the planting of willow cuttings.

### Road Erosion Control

The great amount of this work projected for fall and winter by federal, state and county agencies in California raised the problem of training leaders in the methods and technique. To supply this training, a three-day "school" was held at the Angeles Crest C.C.C. Camp at which Kraebel, Ilch and Pillsbury officiated as the "faculty". From the expected eight foremen, the enrollment grew to a total of twenty-six, and included maintenance engineers and foremen of the State Division of Highways, county road departments, the Los Angeles County Forestry Department and the several southern National Forests. Our mimeographed handbook, "Erosion Control on Mountain Roads", somewhat revised, was used as a textbook and has been very much in demand, both in the California region and elsewhere. The pressure of work has been so insistent that there has been no time for the preparation of articles which have been requested by various highway and engineering journals.

The erosion control staff of the Station continues to serve in a consulting capacity on many going control jobs in the Region.

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### CENTRAL STATES FOREST EXPERIMENT STATION

#### General

On October 9, Dr. B. H. Wilford, E.C.W. entomologist, reported at the Station to assist Dr. Hall in his locust borer investigation. Dr. Wilford took his undergraduate work in forestry at Penn State, his M.F. at Yale, and his Ph.D. in entomology at Michigan in 1933.

As a result of the Station's efforts to collect data regarding the region's land and forest resources by the "travel-log" system, much

valuable information has been secured from portions of the region wherein the Station has undertaken little or no field work. So far, Kuenzel reports that 8,335 miles of highway have been "logged" in 340 counties of the eight States comprising the region.

#### Branch Stations - Experimental Areas

The Sylamore Experimental Forest on the eastern division of the Ozark National Forest was submitted to the Forester. The area includes nearly 3,000 acres of typical Ozark oak and shortleaf pine forest on the headwaters of Livingston Creek, under unusually favorable conditions of protection from fire. Baker, Kuenzel, and Parker spent several days on the area and in Supervisor Koen's office at Russellville, completing plans for immediate improvements and development of the Branch Station with Impnira funds.

A cooperative agreement has been prepared with the Ohio Agricultural Experiment Station, segregating approximately 125 acres of the Shawnee State Forest in southern Ohio for the experimental use of the Station. This area includes stands of oak and shortleaf pine typical of southern Ohio.

#### Station Notes

During October, four more Station Notes, dealing directly or indirectly with the planting and management of black locust for erosion control, were mimeographed and distributed. The complete list of these emergency progress reports is now as follows:

1. Collection of Black Locust Seed. John G. Kuenzel.
2. Extraction of Black Locust Seed. Leonard F. Kellogg.
3. Black Locust Planting For Erosion Control. Leonard F. Kellogg.
4. Site Requirements of Black Locust. John T. Auten.
5. Suggestions for Locust Borer Control. Ralph C. Hall.
6. Growth of Black Locust. Leonard F. Kellogg.

#### Locust Site Study

Auten's field work earlier in the season on the relationships of site and soil to the growth of planted black locust indicated that growth is very definitely influenced by the condition of the "B" soil horizon. Similar field observations had been made in connection with the planted black walnut site study. During the past month the following correlations have been worked out from an analysis of data of "B" horizon properties and the site index height figures accepted for planted black locust.

## Correlation Coefficient

- |  |                   |
|--|-------------------|
| 1. Field estimate of Drainage and site index   | $-.62 \pm .04$    |
| 2. Field estimate of oxidation of soil, as indicated by the color of the "B" horizon, and site index | $-.71 \pm .032$   |
| 3. Compactness of the "B" horizon and site index   | $-.625 \pm .039$  |
| 4. Plasticity of "B" horizon and site index  | $-.56 \pm .044$   |
| 5. Plasticity Number (Laboratory Test) and site index  | $-.572 \pm .0718$ |

As a check on the site index figures used, a correlation was worked out for site index and mean annual growth in cubic foot volume. The very high correlation coefficient of  $.85 \pm .02$  was secured, even though stands of all ages from six to fifty years were included. Therefore, the site index values used in this study obviously provide an accurate criterion for site quality, as far as wood production is concerned.

### Forest Planting

With the authorization to use Nira funds for forest nursery and tree planting in Illinois, Kellogg undertook the collection of a supply of seed sufficient to start this project. With the help of Field Assistant C. R. Cochran, six bushels of cones of shortleaf pine and several bushels of black locust pods were collected, together with a small quantity of pitch pine cones. The seeds, now being extracted at Columbus, are of excellent quality. It is planned to observe the ultimate success of trees from local seed in comparison with trees from seed from foreign or outside sources. For example, foreign seed of black locust and shortleaf pine seed from northern Arkansas will also be used.

### Farm Woodland Management

Day has devoted most of the month to the reconnaissance report of the woodland grazing study. Several maps and charts have been prepared to present graphically some of the more interesting relationships that exist between agriculture, livestock management and forestry in the Central States.

Daniel DonUyl of the Purdue Agricultural Experiment Station has recently submitted an outline for a report of the Pinney-Purdue livestock carrying capacity study. He and Dr. Cain of Indiana University have assumed the responsibility for the compilation and analysis of data and the preliminary writings of this three-year cooperative project.

### Locust Borer

Dr. Hall returned from his trip to Washington early in October, and has spent the month in checking permanent sample plots in Ohio. Emergency counts of adult locust borers have been made in plots in which counts of young larvae were made in the spring, so as to calculate the survival. As

a result of some preliminary analysis of the data collected, there appears to be a very definite relationship between the increase of the trees' diameter at breast height and locust borer survival. The least survival was found in the trees with the greatest increase in diameter for the 1933 growing season. This further substantiates the conclusion that tree vigor and locust borer injury are intimately related.

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#### NORTHEASTERN FOREST EXPERIMENT STATION

##### Demonstration of Portable Gasoline Driven Saw

At the request of the Northeastern Station the Reed-Prentice Corporation of Worcester, Mass., gave a demonstration of the Wolf portable, gasoline driven saw for felling and bucking at the Bartlett Experimental Forest. The saw demonstrated consists of a chain saw operating in a hardened steel, self-lubricating frame, driven by a two-cylinder engine of about seven horsepower. The saw may be used in horizontal, vertical, or oblique position. The weight of the saw with three-foot capacity is only 85 pounds and it can be easily handled by two men. The machine was tried in the felling and bucking of northern hardwoods. In bucking logs up to 14 or 15 inches in diameter, the time required is directly proportional to the cross section area; namely about 28 seconds per square foot. For larger sized cuts there is a considerable increase of efficiency; 20 inch cuts require only 22 seconds per square foot, and 28 inch cuts only about 16 seconds per square foot. Provided no time is lost through binding, a 24 inch hardwood log may be cut through in about one minute. So long as wedging is not required, the saw is equally efficient for felling as bucking and the total time required is about two minutes per square foot of stump. This includes undercutting and notching as well as making the main cut.

The machine is not difficult to handle and should fill a real need in woods work. For bucking it may probably be used with greatest efficiency at yards to which the logs are brought in long lengths by teams or tractors. The machine should prove extremely useful on an operation where trees are to be cut into short lengths in large quantities, as for pulpwood, small dimension stock bolts, fuelwood, etc.

The principal obstacle to widespread use of this machine in woods operations appears to be its cost. Because of the initial development expense and the special quality of all the materials used in the machine, the sale price is in the neighborhood of \$600 to \$700, depending upon the capacity of the machine.

##### Poisoning of Inferior Growth with Cornell Tree Killing Tool:

During the summer an eight-year old plantation of spruce on the Gale River Experimental Forest was released from an overstory of aspen,

red maple, and alder by the use of the Cornell tree killing tool. During the past month this operation has been extended to remove undesirable growth from the areas planted during the past spring and fall.

Two and one-half pounds of sodium arsenite were used to one gallon of water. Some difficulty was experienced in preventing leakage and in preventing the solution from slopping out of the top of the tool. Leakage through the valve was corrected by substituting steel springs for the brass springs furnished by the manufacturer. Leakage at the top proved an annoying factor since the sodium arsenite solution causes troublesome sores if it gets into cuts or scratches on the hands. Working with horsehide gloves overcomes this difficulty but it can be readily corrected by changing the design of the cap.

Response to the poisoning was very rapid, leaves of poisoned trees browning within four days after treatment. Because the solution is so deadly it was found necessary to exercise care to prevent slopping the solution on the ground in the vicinity of any trees which are to be preserved.

Similar work was done with the Cornell tree killing tool to rid planting sites on the Norwich Experimental Forest in New York from inferior growth consisting largely of hawthorn, apple, red maple, and cherry. In one field of 49 acres where the weed growth was relatively heavy, 2.6 man hours per acre were required for the treatment. On a second field of 41 acres, where the weed trees were not so dense, only about 1 hour per acre was required for the treatment.

#### Planting at Gale River

Planting on the old burn type on the Gale River Experimental Forest, which was commenced this spring, was renewed as an activity of the Civilian Conservation Corps. Because of the extremely dry season and the advanced stage of growth at the time of planting, mortality of the trees set out this spring was abnormally high. Twenty-thousand transplants were obtained as replacements and an additional twenty thousand were set out on the eastern edge of the Forest. As indicated above, a large portion of the planted area has been freed of competing growth, largely aspen, alder, and red maple, by poisoning. Wherever the weed growth was of large size, however, girdling was substituted for the poisoning. Study plots are being established to follow the development of this plantation.

#### Planting Studies

During October a check was made of the survival and growth of the experimental plantings on the Norwich Experimental Forest in New York and at North Branford, Conn. In these plantings 2-0 and 2-1 stock of white and red pine, white pine and Norway spruce, was set out at different depths and by different methods in order to ascertain the extent to which depth of planting affects survival and root development. On some of the plots trees were set in a slit made with the grub hoe; on others the roots were spread in dug holes; on others the Harvard planting tool was used.

A protracted drouth followed the planting on the Norwich Experimental Forest which put the trees to a severe test. Because of this drouth, mortality of practically all state plantations in Central New York, was extremely high this season. Under the rigorous conditions which prevail the 2-1 transplants had a better survival than the 2-0 seedlings in our experimental forest. It is also interesting to note that the trees set with the dug hole, with roots spread, showed a distinctly better survival than those planted by the other methods. Whether the better survival is due to a wider distribution of the roots, cultivation of the soil, or removal of competing vegetation cannot be definitely settled. At both Norwich and North Branford, the trees set very low showed the greatest mortality.

Moisture conditions during the summer were favorable in Connecticut and the survival was much higher. A number of the trees from each block were dug up from the North Branford Plots to study the first year's root development. For both Norway and white pine the trees set very low had materially poorer root systems than with the other depths of setting. In many instances the ends of the roots are decayed and sloughed off when the trees had been set extremely low. In the case of the white spruce set very low an adventitious root system had begun to develop close to the ground and some of the lower roots were definitely striking upward toward the ground level. In each case the trees set with the dug hole showed the best development.

A reconnaissance was made of the entire area available for planting on the Norwich Experimental Forest and plans laid for plantings to be made next spring. Detailed maps of the fertility types as indicated by the herbaceous vegetation were made for a number of compartments.

#### Spruce Management

In 1930 the Station established two series of five-acre methods of cutting plots on Mount Deception, New Hampshire, from which the timber has not yet been removed. These plots are designed to bring out additional details of silviculture of the yellow birch-red spruce and sugar maple-beech types for the production of pulpwood. In each type one five-acre plot was given a girdling treatment during the past month to stimulate the growth of merchantable spruce for a few years prior to logging. This job was done by Mr. Westveld with an assistant employed for Nira work. Girdling of hardwoods to release merchantable spruce several years in advance of logging is a practice recommended strongly by Westveld for general adoption in the region.

#### Bartlett Experimental Forest

During October work was started on the two large scale experiments to be undertaken on the Bartlett Experimental Forest in connection with the Civilian Conservation Corps and N. R. A. activities. An area of about twelve acres selected by Stickel, between two brooks, was laid out for an experimental burn to study various aspects of fire damage. The area has been subdivided into one-chain squares, each of which will be handled as

a separate sub-plot in the tally, and reproduction has been recorded, gridironing the area at two-chain intervals. The area is to be surrounded by fire line to be constructed by the C. C. C.

Plots were also laid out on the areas to be clear cut and selectively cut in the adjacent compartments on which these two methods of handling northern hardwoods are to be studied. An area of about five acres is to be cut under each system this fall. Laying out of these plots and tallying the timber kept a four-man crew busy for several weeks.

#### Cooperating Bureaus

At the close of the season Doctor MacAloncy reports a great reduction in the amount of weevil damage to white pine this year. Not only was this very noticeable on the sample plots upon which detailed records are obtained each year, but reports were received from widely scattered localities in the region, indicating that the reduction of weevil population was quite general. It is probable that this is the result of unfavorable weather conditions during the hibernation period last winter.

The Biological Survey has reached an agreement with the State of New Hampshire for the use of the Pillsbury State Forest as an experimental area to study the possibilities of obtaining some current income from wild life in connection with forest management. The Pillsbury State Forest is a tract of about 3,000 acres in the central part of the state. The northern portion of the tract is a natural basin enclosing three small lakes. The forest in this basin formerly supported a heavy stand of pulpwood. It now represents typical conditions of culled northern hardwood forest with a considerable understory of softwoods on the lower slopes. The southern portion of the forest represents a variety of conditions, including tamarack swamp, old fields, and recently cut-over hardwood land.

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#### NORTHERN ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION

The month of October has seen the practical termination of work by the Station with C.C.C. forces and the inauguration in its place of work with Imphira funds. Fortunately, by shifting plans frequently we were able to carry through most of our year's program in research.

#### Silviculture

Through E.C.W. and N.I.R.A. men and funds it was possible for the Station to carry out three experimental thinning projects during the field season. The objective was to experiment with methods and to establish permanent thinning plots rather than to secure any great acreage. Approximately 25 acres were thinned in 45-year old ponderosa pine near Missoula, 15 acres in 75-year old western white pine on the Priest River Experimental Forest, and 5 acres in 65-year old western white pine on the Deception Creek Experimental Forest.

Light, medium, and heavy degrees of thinning were carried out and thinning from below was the method chiefly used. This method appears to be best adapted to the mixed stands of the western white pine type. Where there was a distinct cedar understory on the Priest River area, however, heavy marking leaving only crop trees in the overwood resulted in a thinning from above with the cedar serving to shade the ground and to develop into a secondary crop. Some liberation and improvement thinning and pruning was also done. Altogether 23 permanent sample plots were established on the three areas. Trees to be left were marked with tags cut from old magazine paper. Weidman and three cultural foresters were engaged on the work most of the summer. Felling by the C.C.C. boys progressed very slowly during the first half of the summer due to unfamiliarity of the men with axe work and the short work period. The men did much better work the last half of the season.

Although the four silviculture field assistants were dropped in July, it was possible to finish the annual plot and quadrat examinations. This work had to be done hastily, eliminating some of the usual operations, but was accomplished without too great loss of important long term records.

Haig completed his work upon the survival study project at Priest River and returned to Missoula. The data upon initial seedling survival gathered during this record season check closely with those obtained during 1932 and we now have a reasonably clear picture of the role played by important habitat factors in initial seedling establishment, at least under the relatively severe site conditions studied.

As in 1932, birds, insects (particularly cutworms belonging to the family Noctuidae) and various fungi destroyed a large percentage of the seedling crop. These agencies are particularly active during May and June. Due to the unnatural concentration of seedlings upon sown plots, however, no accurate attempt can be made to evaluate the role played by these biotic agencies under more natural conditions.

Among the physical factors it is readily apparent that soil moisture and surface soil temperature are the factors of major importance as direct causes of mortality. These factors are controlled in turn by a number of other important habitat factors such as precipitation, cloudiness, evaporation, etc., most of which are markedly influenced by the degree of overhead shade, the agent most easily controlled by the silviculturist. Nevertheless soil moisture and surface soil temperature are the most important factors directly influencing seedling mortality and hence under the site conditions studied the silviculturist is chiefly concerned, from the standpoint of initial establishment, with the creation of favorable conditions of soil moisture and surface soil temperature. Of these factors surface soil temperature proved by far the most important, for due to the dry, clear summers characteristic of the region, sustained periods of killing temperatures were very common on exposed sites. For example, during the 1933 season surface soil temperatures on a fully exposed site ran above 120° F, the commonly accepted danger point, for 22

out of 31 days during July and 24 days out of 31 for August. Surface temperatures of over 140° F upon mineral and over 160° F upon duff proved fairly common during the 1933 season. As recently mentioned by Wood of the Allegheny Station there exists a direct relationship between the moisture content of the surface soil and its temperature. At the Priest River Station dangerous surface soil temperatures were never reached in moist soil, but after the surface soil was once dry the only temperatures of under 120° F were associated, at least during July and August, with periods of cloudy weather or light rain.

In this connection it seems doubtful if the value of frequent summer rains has ever been truly evaluated, for not only do such rains play an important part by replenishing soil moisture, a readily recognized role, but they must also in many types play a very important part in wetting down the surface soil, and thus largely eliminate insolation, at least temporarily, as an agent of seedling mortality.

#### Fire Research

To determine the desirability of continuing to operate the many cooperative weather stations in the Region which report daily to the Weather Bureau during each fire season, an accuracy rating of fire-weather forecasts has been started. A scheme of rating the "skill" of the forecaster is being followed as outlined by H. H. Clayton in the Bulletin of the American Meteorological Society for October, 1927. In classifying forecast terminology as many as seven phrases were found to be synonymous. Such multiplicity of terms is confusing and recommendations for greater simplicity and standardization of forecasts will no doubt result from this study.

The annual oven-drying of some 200 wood cylinders has been started. The sticks from 16 stations in the Region have been dried to date and returned for winter exposure.

Requests for 143 Northern Rocky Mountain wind gauges have been received, all but 3 of the 19 forests having placed orders. One forest ordered 24 of these gauges which can be manufactured for about \$3.00 each.

#### Forest Survey

Two Nira forest technicians and two assistant forest technicians were put to work early in October mapping in place in north Idaho. These men started in where work was discontinued early in July due to lack of regular funds. The work during the latter part of the month was somewhat handicapped by bad weather. It is expected that the four men will continue mapping in the field until well toward the end of November if weather and road conditions permit. During the winter the men will help in the collection of cruise data, compile the results of the last season's work, and prepare base maps and overlays for the next field season.

Late cruises were collected in detail by forties on 165,000 acres of Idaho State timber. The bulk of this timber lies in Clearwater and

Latah Counties, Idaho. In addition the estimates on the timber holdings of two relatively small private owners in Pend Oreille and Spokane Counties, Washington, were also obtained.

### Logging and Milling

Computation work on the Selective Logging Study conducted last fall on the Anaconda Copper Mining Company holdings is practically completed. Anderson expects to have the manuscript of the project report complete by January, unless lumber price fixing developments of the Lumber Code Authority make it necessary to supply a new lumber price schedule to the data. Applying the following average lumber selling values to plot 1 (clean cut according to prevailing company practice) the results indicate the economic impossibility of the company operating under wage scales fixed by the code unless selling values are also increased.

Ponderosa pine - \$19.83 per M lumber tally.

Larch-Douglas fir lumber - \$15.38 per M lumber tally.

Larch-Douglas fir mining stull - \$19.00 per M net  
log scale.

A comparison of the total production costs and total selling value for the ponderosa pine, larch and Douglas fir logged from this area shows a net loss of 28 cents per M for a volume of 61,650 feet net log scale.

#### Net Volume Logged.

Ponderosa pine.	Net profit per M feet net log scale, .19	54,870
Larch-D. fir	Net loss per M feet net log scale, 4.12	6,780
Ponderosa pine & Larch-D. fir	Net loss per M feet net log scale, .28	61,650

Stumpage value of the timber cut was not included as a production cost in the above calculation, nor was any allowance made for margin for profit and risk.

Wages and other contributing factors used in computing production costs were identical with those used by the company in operating at the present time under the N.R.A. Such being the case, if the results obtained from this plot are indicative of the entire operation, it is apparent that a reasonable margin for stumpage, profit, and risk could not be obtained unless average ponderosa pine selling values were between \$27.00 and \$28.00. Under selective logging (above area was clean cut) it now appears that the required selling value could be reduced approximately \$3.00 per M.

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PACIFIC NORTHWEST FOREST EXPERIMENT STATION

Section of Products

General

There have been fewer requests for information than usual. Identification of several wood specimens has been asked; data on steam distillation of cedar wood and on possible outlets for rejected crate slats have been requested; and there have been several calls for data on the salvage of timber on the Tillamook burn.

Logging Congress

Lodewick, Johnson and Rapraegar attended various sessions of the 24th Pacific Logging Congress. The first day was given over to discussions of caterpillar and tractor logging, and bulldozer operations. On the second day a field trip was taken to the Cathlamet operation of the Crown Willamette Paper Company. The third session was spent on discussions of safety, log scaling and grading, and the lumber industry code.

Small Mills

There appears to be a growing interest as to the place of the small mill in the lumber industry in Oregon and Washington. Several requests have been received in this regard. Tabulations prepared showed that in the Douglas fir region in 1925, 398 operating mills, with a rated capacity not exceeding 50 M feet per day, produced 7 percent of the regional cut; in 1929, 716 mills, 11 percent; and in 1931, 374 mills, 8 percent. In the pine region in 1925, 228 such mills cut 20 percent of the production, in 1929, 208 mills, 18 percent; and in 1931, 124 mills, 13 percent. Johnson's report "The Small Mill Industry in the Douglas Fir Region" was published in the October issue of The Timberman.

Farm Timberland

Johnson and Lodewick spent nine days in the field securing data relative to the amount of cordwood recovered from trees of various sizes on a tract 10 miles southeast of Molalla, Oregon. This tract of virgin timber had been recently logged by a small sawmill operator, and the remaining trees, which were quite defective, were being removed for cordwood. Data were obtained on some 20 trees, together with production time per cord, and cost and depreciation on equipment. Measurements were taken on about 55 cords of old and second growth Douglas fir cordwood and on 20 cords of cottonwood pulpwood to determine the solid wood content of stacked cords.

Cooperation Laboratory

A request was received from the Forest Products Laboratory for two cords of western hemlock for pulping tests. One day was spent in the field running down possible sources from which this material could be secured.

## Forest Economics

### New Public Domain

Checking and computation of tax delinquent and public land areas was completed for Coos and Josephine Counties, Oregon and are now well under way for Douglas County, Oregon and Grays Harbor County, Washington. The Jefferson County, Washington map of tax delinquent and publicly owned lands was finished. Studies showing variation in assessed values and taxation of selected timberlands in four Oregon counties were completed. Preparation of this study was given right of way over others, because of the request for immediate information made by the State of Oregon legislative interim committee on timber taxation. Considerable time was consumed on the problems of forest land ownership arising out of Section 10 of the NRA Lumber Code, the Tillamook and Clatsop fires, back to the land movements, and broad-spread tax delinquency of forest land. Mr. Wilson spoke before the Portland Progressive Business Men's Club on "No Man's Land" October 12, and before the Oregon Council for Protection of Roadside Beauty on the Copeland Report, October 26. Mr. Richard Kearns, M.F.S., with Junior Forester standing received an appointment as forest technician under NIRA and began work as assistant in the new public domain studies on October 10.

### Selective Logging in Douglas Fir

Brandstrom devoted the entire month to various minor jobs. A good deal of time was spent on getting together data on the salvage possibilities in the Tillamook burn. About a week was spent on the distribution of the selective logging bulletins, which requires a letter of transmittal from this Station for mailing under government frank. Half a week was spent at the Pacific Logging Congress which was in session in Portland on October 25, 26 and 27.

### Mensuration

The field work of none of the major mensurational projects, except the growth phase of the Forest Survey, is as yet complete enough for final analysis this winter. The preliminary computations for these projects will, however, be brought as much up to date as possible. This applies to the Sitka spruce-western hemlock yield study, as well as to the range-wide ponderosa pine yield study. Preliminary yield tables for the spruce-hemlock type are being contemplated for immediate use, later to be revised and elaborated with the addition of data. In connection with this study, a set of 6 volume tables for western hemlock has just been completed, covering volume by Scribner rule in 32-foot logs to a 12-inch top, volume by Scribner rule in 16-foot logs to an 8-inch top, volume by International rule to a 6-inch top, and cubic-foot volume. These tables are being issued in mimeographed form.

### Forest Survey

By the end of October the Survey had 15 additional people at work under the NIRA program; 4 technicians, 4 assistant to technicians, 3 draftsmen, 3 computers, and 1 stenographer. Five of these additional men are on

field work in eastern Oregon, and the rest are working at Douglas fir region computations and maps. The Survey has three crews check cruising in Lake and Klamath Counties on the east side of Oregon, and one crew of 2 men developing a technic for mapping cut-over pine lands in Deschutes County (eastern Oregon) in order to get ready for east side field work next season. The bulk of the Survey's regular staff, however, and most of the additional NIRA personnel, are still on Douglas fir region office work.

Site maps for a large portion of the lands both inside and outside the boundaries of national forests in western Washington have been transcribed to the new 1/4-inch-to-the-mile state base map.

Procedure and technics have been worked out for generalizing the detailed 1-inch-to-the-mile type maps and for reducing and transferring these maps to the new 1/4-inch-to-the-mile state base maps. Blank vellum sheets are laid over the 1-inch-to-the-mile type maps and the generalizing is done on these vellum sheets. These vellum are then photostatically reduced to the scale of 1/4-inch-to-the-mile and are oiled to make them more transparent. The oiled photostat is inserted under the state base map, both of these maps placed on a light table, and the consolidated types are then traced directly on the base map.

A technic for putting on the square and longitudinal symbols used to designate second growth types on the 1-inch-to-the-mile colored type maps has been developed. Formerly these lines were laboriously ruled out by hand, using the appropriate colored crayon and shifting the ruler and crayon for each individual line. This was a time-consuming process. By the new technic, zinc plates are made with the proper designs, these plates inserted under the proper type area on the blue-line print which is to be colored and the appropriate colored crayon is rubbed over the top of the map. The design produced is then "fixed" by spraying a fixing solution on the map with an atomizer. This process cuts down the time of the conventional method by three or four times and increases the number of color combinations available in a specified number of crayons by many times.

A new type of map sheet holder is being tried out for east side field work. A transparent envelope of the size sufficient for map sheets is made by sewing two pieces of transparent .021" celluloid together, leaving one end of the envelope open. A piece of .051" opaque white celluloid is put in the envelope for a stiffener and also for a mapping sheet to be used in wet weather. The base map and the type vellum sheets are then fastened together with a Bostitch machine and are inserted in the envelope between the stiffener sheet and the transparent outer celluloid cover, with the face of the map sheet on the outside. When the field mapper is walking between points he carries the map sheets in the envelope protected from brush, dirty hands, etc., and he can at all times see his map through the celluloid without opening any tatum or book covers of any sort. When he stops to map, he draws the map sheet from the envelope, puts it on top of the stiffened envelope and goes to work. This arrange-

ment is lighter than map boards and tatum holders, protects sheets from dirt and tearing better than map boards, and in addition has the advantage of making two map sheets visible at all times.

### Section of Silviculture

#### Fire Studies

To determine the "safe" range of visibility, over 100 smoke tests were made early in the month to add to tests previously obtained. This work was stopped for the season due to unsatisfactory weather, but if suitable weather occurs enough additional tests can be made to complete the study this season. Most of the field data have now been worked up and a report on the project has been started. The various statistical data needed to round out this report are now being worked up from the national forest fire reports.

Morris completed his analysis of the weather factors prevailing at the time of the recent Tillamook fire. To determine whether or not the weather conditions at the time of the fire should be considered extremely unusual, he prepared tables and charts summarizing the weather conditions existing in previous years in the locality where the fire occurred. It would appear from these analyses that in late September, 1929, and in early October, 1932, there were periods when the weather, from the standpoint of fire spread, was probably as bad as in the last half of August, 1933. These analyses will be made a part of the comprehensive report on the Tillamook fire now in preparation. Arrangements also were made with the local Weather Bureau to prepare a joint report on the fire weather factors influencing the spread of the Tillamook fire. McArdle wrote an account of the Wolf Creek fire for the Four L Lumber News. This fire occurred at the same time the Tillamook fire was burning, and has been somewhat overlooked because of the huge size of the latter. In ordinary times, however, the Wolf Creek fire would be considered exceptionally large.

Morris began a report dealing with the major conflagrations which have occurred in Washington and Oregon in past years. McArdle and Matthews prepared for Colonel Greeley a statement giving various statistics on forest fires in this region. Among other things these statistics show that the logged-over lands in the Douglas fir region are reburning at the rate of at least 2.3 percent per year, and that 81 percent of this occurs on lands logged since 1920. The lands logged since 1920 are reburning at the rate of 3.5 percent per year. These figures do not include the original slash fire. From the Forest Survey records it was found that for 11 counties in the Douglas fir region in Oregon, 1/3 of the lands logged since 1920 are poorly stocked or nonstocked with reproduction; only 28 percent of the half million acres included in this analysis were classified as being well stocked with reproduction. About half of the total acreage of cut-over lands in the Douglas fir region is the result of logging since 1920.

Matthews began computations on the studies of fuel inflammability preliminary to the preparation of a report on this project.

#### Ponderosa pine management

Kolbe spent all of the month in the field remeasuring sample plots of the methods of cutting studies. Rapraeger partially completed the

manuscript for Part II of the report on the financial aspects of various methods of logging ponderosa pine. This part deals with ponderosa pine under private ownership and is a companion report to Part I which gave similar information for stands under public ownership.

#### Douglas fir management

Issac has closed for the season all field work in connection with the Douglas fir natural reproduction studies. Most of his time during the month has been spent in preparation of a comprehensive report on Douglas fir silviculture and in drafting plans for conduct of ECW and NIRA work on the experimental forests.

#### Survey of Experimental Forests

Excellent progress has been made on the surveys of the experimental forests. At Wind River 10,200 acres were mapped and cruised intensively; 20 miles of spirit levelling, 32 miles of transit traverse, and 26 miles of double Abney section line control were run. At Pringle Falls 2,560 acres were mapped, 15 miles of spirit levelling and 15 miles of double Abney section line control run. Cooperating with the Coast and Geodetic Survey party, Pringle Falls was made a second order triangulation station. The map control was then tied in to this Station. Approximately twenty standard Forest Service iron pipe section corners and three permanent bench mark tablets were set. All the work was performed by cruisers and engineers employed as ECW foremen assisted by enrolled CCC men who were trained to run compass, to chain, and to map topography.

#### NIRA work on Experimental Forests

At Pringle Falls a combination work shop, garage and woodshed were constructed completing for the time being the physical plant at that station. At Wind River considerable work has been started in improvement of existing buildings and extension of the arboretum. Practically all of the road and trail work scheduled for the experimental forests has been assigned to ECW and definite plans for further work of this character under NIRA are now awaiting definite information as to the amount of work which can be completed under the ECW program. Plans have been made to examine and cruise the proposed experimental forest in the fog belt at Cascade Head on the Oregon Coast. When this forest has been established, considerable of the NIRA construction program will be concentrated there.

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#### SOUTHERN FOREST EXPERIMENT STATION

#### Naval Stores

Measurements of longleaf needle fall in three stands of second-growth timber were made on the Olustee Experimental Forest for the period August, 1932, through July, 1933.

Figures for the average of the three densities (793 trees per acre) are as follows:

Month		Oven Dry Weight per acre
		Pounds
August,	1932	210
September,	"	254
October,	"	526
November,	"	269
December,	"	96
January,	1933.	101
February,	"	56
March,	"	75
April,	"	75
May,	"	364
June,	"	453
July,	"	300
	Total	2,779

### Forestation

Plans for expansion of work under Nira increased the Station's requirements for seed of the southern pines, principally for use in direct seeding in connection with natural reproduction studies. To meet these needs, the Station collected 62 bushels of longleaf pine cones on a logging operation, using C.C.C. labor, and bought 38 bushels of slash, 15 bushels of loblolly, and 5 bushels of shortleaf cones. Because of the poor seed crop of longleaf pine this year, it was necessary to include a very high percentage of insect-infested cones of this species. Detailed extraction data were obtained from experimental lots of cones so far as the capacity of the regular air-temperature extraction racks permitted. The most interesting data were the yields of thoroughly cleaned seed from two bushels of slash pine cones, one insect-free and the other completely infested with larvae of a moth, presumably Dioryctria amatella. The bushel of sound cones yielded 310 grams of clean, sound seed, and the infested bushel only 152 grams.

Twenty-eight pounds of slash pine seed was purchased from private collector who had hand-rubbed the dry seed to free it from wings and had winnowed it outdoors in a stiff breeze. The Station extracted 21 pounds of the same species, removed the wings by wetting the seed, stirring it vigorously, and drying it in the sun, and cleaned the seed by means of a "Clipper" seed mill. The private collector had not kept accurate record of his time, but apparently it was at least two or three times that required by the Station to clean an equivalent quantity. Yet the quicker method gave distinctly better results, as shown by the following figures:

	Percentage of trash other than empty seeds, by weight	Percentage of empty seeds left after removing trash, by count
Slash pine seed cleaned by private collector	3.70	30.8
Slash pine seed cleaned by Station	0.22	2.8

## Management

Several thinning plots established at Urania in 1928 in old-field loblolly pine were remeasured and rethinned. The diameter (d.b.h.) growth of the crop trees on the thinned plots was only very slightly better than that of the crop trees on the check plots. It appeared that the thinnings failed to stimulate growth of crop trees either because they were not heavy enough or had been too long delayed. Although the remeasurement data have not yet been analyzed, it is evident that it is not easy to thin old-field loblolly pine heavily enough and early enough to produce a definite increase in the growth of the crop trees without decreasing the final yield or producing short-bodied, limby trees.

## Financial Aspects of Private Forestry

Progress was made on the financial aspects of timber growing report for Union Parish, Louisiana. The compilation of field data for the Georgia Land Use Study was carried forward.

The marking of virgin shortleaf and loblolly pine in Case Study No. 2 was continued and will probably be completed by the end of November.

## Erosion

The annual examination of erosion control forest plantings on all experimental areas was completed. An examination of the stock in the black locust nursery seeded May 30th and 31st showed the following: The height of the tallest tree was 8.05 feet, while many were well over 7 feet high. It was found that the rows planted to treated seed had 112 percent more trees than those planted to untreated (check) seed.

## New Public Domain

Craig spent the first part of the month at Jackson, Mississippi, obtaining data on the extent and location of tax-reverted lands in that State. The records of the State Land Commissioner showed that the total area reverted to State Title for delinquent taxes as of October 1, 1933, exclusive of tracts under application for purchase or under lease or rental, and exclusive of platted subdivisions and of tracts less than 20 acres in area, is 1,129,227 acres or 3.8 percent of the gross area of the State. The gross total, including the areas deleted, is at least 1 1/4 million acres, or 4.2 percent of the gross area of the State.

This reverted area has two major concentrations - one in the Yazoo Delta, of which 5.7 percent of the gross area has reverted, and the other in the southeastern Mississippi longleaf pine belt, of which 6.1 percent has reverted. These two regions, comprising 33 of the State's 82 counties, have 66 percent of the total reverted area now in State Title. Two minor concentrations were also noted - one in Choctaw, Webster, and Chickasaw Counties in the central Mississippi shortleaf-loblolly pine belt, and the other in Lincoln, Franklin, and Leflore Counties, in the Southwest Mississippi longleaf pine belt.

In descending order of percent of total area reverted, the first ten counties are as follows:

Stone	- (SE. Miss.)	23.7 percent
Humphreys	- (Delta)	15.9 "
Perry	- (SE. Miss.)	15.2 "
George	- " "	14.3 "
Quitman	- (Delta)	13.1 "
Sharkey	- "	12.1 "
Issaquena	- "	11.9 "
Harrison	- (SE. Miss.)	10.6 "
Jackson	- " "	10.3 "
Chickasaw	- (Central Miss.)	10.1 "

Comparable figures for Louisiana (supplied by Dr. R. L. Thompson, Dept. of Economics, L.S.U.) show that Louisiana now has title to 2,707,875 acres, or 9.3 percent of the gross area of the State. Of this total, 913,419 acres reverted in the period 1900-1924, inclusive.

In Louisiana, as in Mississippi, reversion is concentrated in the longleaf pine belt and in the Delta, with a few minor concentrations elsewhere. The southwest Louisiana longleaf pine belt has a very high percentage of reversion; Vernon, Allen, Beauregard, Calcasieu, and Jefferson Davis Parishes having from 15.9 percent to 28.3 percent of their respective gross areas in State title. In the Delta, reversion is more spotted, some parishes having no reversion at all, while Avoyelles Parish has 37.2 percent of its area reverted; Plaquemine, 18.8 percent; St. Martin, 14.3 percent; St. John the Baptist, 12.1 percent; East Carroll, 11.3 percent; and Richland, 9.0 percent.

If the total area reverted in these two States for the period 1925-31, inclusive, is divided on the basis of the percentage derived from the tax-sales of each year, it is very evident that the bulk of the reversion has occurred since the advent of the present depression. The fairly close agreement in percentages between the two States is also striking.

State	1925	1926	1927	1928	1929	1930	1931
<u>Mississippi</u>							
Acres	20,481	40,839	43,341	24,331	92,073	144,766	670,777
% of total	2.0	3.9	4.2	2.3	8.9	14.0	64.7
<u>Louisiana</u>							
Acres	24,603	23,325	20,106	38,389	63,091	365,665	1,259,547
% of total	1.4	1.3	1.1	2.1	3.5	20.4	70.2

## Forest Survey

The allotment of Nira funds has made possible a great expansion of the activities of the Survey in the South. During October, the entire office force worked on plans for the selection of field party personnel and drew up a working plan for the naval stores region.

R. K. Winters and V. B. Davis of the Station Staff have been temporarily transferred from forest management projects to the Forest Survey. Three additional clerks have been assigned to the office force to assist in the computation and typing of the report on the Bottomland Hardwoods of Mississippi.

Fifteen men were selected from the Timber Expert Civil Service register and received appointments as field party chiefs, reporting for duty on October 18th. These men were immediately assigned to training camps, nine attending the pine training camp at Poplarville, Mississippi, under the direction of M. M. Lchrbas and six attending the hardwood training camp at Lake Providence, Louisiana, under J. A. Putnam. By the end of October, rapid progress was reported by both training camps.

## Forest Pathology

The manuscript entitled "Observations on the Influence of Fire in the Brown-Spot Needle Blight of Longleaf Pine Seedlings" was given a final revision and submitted to Washington for publication.

Siggers and Wahlenberg visited the McNeill experimental area to determine the amount of the brown-spot needle blight on the various plots with different fire histories. The average amount of diseased tissue on seedlings on the areas burned annually since 1923 was 13 percent, while on adjacent areas, unburned since 1923, it averaged 34 percent.

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## R-2 RESEARCH ACTIVITIES

While on the Bighorn Forest in Wyoming Roeser started to remeasure the two 3-plot groups of pole and sapling lodgepole pine plots that were laid out and thinned administratively in 1927-28 on the Buffalo District of the Forest. This remeasurement was completed with the aid of a C.C.C. crew from the Muddy Camp, who contributed 65 man-days of labor, during the first week of October. In addition to remeasuring the residual stands, a number of trees were measured for volume in the sapling thinning plots; also interior plots were established within the existing unthinned and excessively large check plots, in order to facilitate future operations within the two blocks. It was due only to the opportunity to employ C.C.C. enrollees that it was possible to undertake work in this particular area during the past field season. The work of the enrollees, not only from this camp but also from the four others from which men were drafted to assist in research operations, was very satisfactory. They exhibited not

only a surprising aptitude to perform the work with dispatch without sacrificing the necessary accuracy that pertains to this kind of work, but they also showed a keen interest in its purpose. Their spirit was at all times excellent. The opportunity to associate with these men, to train and teach them, and to procure the benefit of their cooperation constituted a real privilege.

After leaving the Bighorn Forest, seventeen days were spent in the Black Hills Forest for the primary purpose of installing two series of thinning plots in ponderosa pine to study growth following thinning and to check the development of stands that are being thinned by C.C.C. labor according to the specifications outlined by the Regional Office. The working base was established at Camp F 3, on Este Creek, two miles from the Nemo base within the Black Hills research center. This camp also supplied a crew of eight to ten men under W. H. Maxwell to help in laying out the proposed plots.

Two series of plots were established within the center, as follows:

Block L, - in an immature pole stand, averaging 40 years in age, 15 - 30 feet tall, and approximately 3 to 4 inches d.b.h., - 3 plots of ~~1/2-acre~~ each to be thinned to approximate spacings of  $7\frac{1}{2}$ , 10, and  $12\frac{1}{2}$  feet, with a ~~1/4-acre~~ unthinned check plot. Onehalf of each thinned plot is to be pruned, while the other half will not be pruned.

Block M, - in a dense sapling stand, averaging 30 years in age, 6 - 15 feet tall and 2 inches d.b.h., - 4 plots of  $\frac{1}{4}$ - acre each, including three to be thinned to approximate spacings of 6, 8, and 10 feet and one to be left unthinned as a check.

In the latter group, heights as well as diameters will be recorded in order to determine the effect of spacing on the height growth of the residual trees and subsequent changes in taper and form factor development.

At the close of the month, the task of establishing these plots had almost been completed. The slash was left in place on the ground, in general without lopping, in accordance with the new policy which appears to be on the way of superseding the old pile and burn policy.

In addition to the new work that was undertaken, the three cut-over plots, to determine the best weight of cutting in mature saw-timber stands, constituting the Benchmark group, were remeasured, as were also Block A and Block C, both of which date back to 1906. The former Block A includes three plots established in "dog-hair" reproduction to study the process of natural thinning; the latter includes three thinned plots in a 90-year old pole stand that is approaching maturity. The results still await compilation.

The annual examination of the slash on the Este Gulch plots of 1929 to determine the effect of different methods of slash disposal upon subsequent fire hazard and the silvicultural development of the stand was also made. Likewise, the reproduction study plots in the Rochford burn of 1931 were inspected. No natural reproduction is, as yet, to be found, which may

be expected in view of the failure of recent seed-crops. However, the year 1934 gives every evidence of being a good ponderosa pine seed year and the fate of its seed crop will be vitally significant from the standpoint of the natural restocking of the burned-over area. So far as the attempt at artificial reseeding is concerned, it has been an almost complete failure. It is believed that this has largely been due to the activity of birds and rodents in collecting and eating the seed. The evidence indicates that the seed was removed shortly after it was sown on the ashes and upon the bare ground, and that washing and erosion were responsible to only a minor degree in its disappearance and failure to germinate, since no assimilation of seeds has been noted anywhere near the seeded sections.

A careful analysis is being made annually of the herbaceous ground cover, and some interesting changes in the ecological association are taking place. The prompt reestablishment of the ground flora has helped appreciably to retard erosion, although serious disturbance by erosion has followed the almost complete destruction of all of the cover by the disastrous fire. This was brought out in Mr. M. W. Thompson's statement in the recent Service Bulletin of October 23, under the caption "Erosion in the Black Hills".

In connection with the possibility of restoring the stand by natural means upon the burn, it is interesting to note that approximately two-thirds to three-fourths of the potential seed trees within the burned-over area that were scorched but survived the fire are still green and give satisfactory indications of living on. Two rather dry years have had some effect in increasing the mortality by reducing the chances of injured trees to pull through; it is believed.

Before returning to Colorado Springs, Roeser made a brief visit to the Harney Forest to inspect local administrative thinning and slash disposal plots. Some time was also spent in inspecting some of the C.C.C. and "Nira" thinning work which has been done. As a general rule, little fault is to be found with the character of the work or with the policy which governs the operations. Some apprehension is felt, however, over the activity of porcupines in certain thinned areas, and it may be necessary eventually to undertake an organized campaign to eliminate these pests.

Supervisor Hilton reported the completion of the work of establishing Blocks N, O, and P, three groups of thinning study plots in the lodgepole pine type on the Medicine Bow Forest. A description of these plots was made in the September 1st report. 377 man-days of C.C.C. labor were used in accomplishing this work.

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MANUSCRIPTS

PACIFIC NORTHWEST

Variation in the 1930 Assessed Valuation and Taxation of Selected Timber-  
lands in Clatsop, Tillamook, Benton and Lane Counties in Oregon.  
S. A. Wilson.

Some Facts Concerning the Tillamook Fire. R. E. McArdle, D. N. Matthews  
and W. G. Morris.

Memorandum report giving statistics on Oregon forest fires. R. E. McArdle  
and D. N. Matthews.

Volume tables for western hemlock; western Oregon and western Washington.  
(11 pages mimeographed) W. H. Meyer.

APPALACHIAN

Some factors affecting the bark thickness of second-growth longleaf pine.  
(For Jour. of Forestry) A. L. MacKinney.

Logging damage in selectively logged loblolly pine stands. (For Jour.  
of Forestry) A. L. MacKinney.

IN PRINT

Analysis of Logging Costs and Operating Methods in the Douglas Fir Region.  
(Published under the auspices of the West Coast Lumberman)  
A. J. F. Brandstrom.

The present status of Brewer's blackbird in the southeast. (Wilson Bulle-  
tin, XLV, No. 3, Sept. 1933.) T. D. Burleigh.

The Small Sawmill Industry in the Douglas Fir Region. (The Timberman,  
October, 1933) H. M. Johnson.

The Tillamook Fire. (Service Bulletin, Oct. 23, 1933) R. E. McArdle.

The Wolf Creek Fire. (Four L Lumber News, Oct. 15, 1933) R. E. McArdle.

Basal Fire Wounds on Some Southern Appalachian Hardwoods. (Jour. For.  
Nov. 1933.) Ralph M. Nelson, Ivan H. Sims, and Margaret S. Abell.

Motor Truck Log Hauling in Oregon and Washington. (Fourth instalment,  
The Timberman, Oct. 1933) E. F. Rapraeger.

Two Motor Truck Log Loading Methods. (Southern Lumberman, October 15, 1933)  
E. F. Rapraeger.

Observations on the Thinning of Fifteen-Year-Old Norway Pine. (Jour. For.  
Nov. 1933) T. Schantz-Hansen.

Relation of Stumpage and Log Prices to Other Commodity Prices. (Jour.  
For Nov. 1933) Henry B. Steer.

